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5P62 - Development of bipolar pulsed transmitter based on modular structure for mineral exploration

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This paper describes a 25kW bipolar pulsed transmitter based on modular structure for mineral exploration. The specifications of unit module including a LCC resonant converter and full bridge-based bipolar pulse switching unit are 500V, 12.5 A of output voltage and current, and DC to 8 kHz of pulse frequency. The LCC resonant converter having a trapezoidal-shaped resonant current is designed to reduce conduction loss. The leakage inductance of the transformer is utilized as resonant inductance without an additional inductor to achieve the high power density. Furthermore, to operate the frequency range from DC to 8 kHz and decrease the size of gate transformer, the gate drive circuit with the repetitive short pulse is proposed. According to the load condition, the bipolar transmitter capable of delivering the required high voltage and low current (2kV, 12.5A) or low voltage and high current (500V, 50A) is performed either grounded dipole mode or loop mode respectively. Four unit modules are connected in series and parallel in order to operate the power supply in either loop mode or grounded dipole mode. To satisfy the output voltage balancing between four unit modules, the tertiary wire is wound to compensate the phase difference of power transformer on LCC resonant converter. Finally, based on the development of the bipolar pulsed transmitter, experimental results with the inductive resistor load and field test will be discussed in conference.

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